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FEE TRANSMITTAL for FY 2005

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☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) 340.00

Complete if Known	
Application Number	09/864,339
Filing Date	May 25, 2001
First Named Inventor	Atkinson
Examiner Name	Edward A. Miller
Art Unit	3641
Attorney Docket No.	568

METHOD OF PAYMENT *(check all that apply)*

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FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1001	790	2001	395	Utility filing fee	
1002	350	2002	175	Design filing fee	
1003	550	2003	275	Plant filing fee	
1004	790	2004	395	Reissue filing fee	
1005	160	2005	80	Provisional filing fee	

SUBTOTAL (1) ($)

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

		Extra Claims		Fee from below	Fee Paid
Total Claims		-20** =		X	=
Independent Claims		- 3** =		X	=
Multiple Dependent					=

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
1202	18	2202	9	Claims in excess of 20
1201	88	2201	44	Independent claims in excess of 3
1203	300	2203	150	Multiple dependent claim, if not paid
1204	88	2204	44	** Reissue independent claims over original patent
1205	18	2205	9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($)

**or number previously paid, if greater; For Reissues, see above

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1051	130	2051	65	Surcharge - late filing fee or oath	
1052	50	2052	25	Surcharge - late provisional filing fee or cover sheet	
1053	130	1053	130	Non-English specification	
1812	2,520	1812	2,520	For filing a request for *ex parte* reexamination	
1804	920*	1804	920*	Requesting publication of SIR prior to Examiner action	
1805	1,840*	1805	1,840*	Requesting publication of SIR after Examiner action	
1251	110	2251	55	Extension for reply within first month	
1252	430	2252	215	Extension for reply within second month	
1253	980	2253	490	Extension for reply within third month	
1254	1,530	2254	765	Extension for reply within fourth month	
1255	2,080	2255	1,040	Extension for reply within fifth month	
1401	340	2401	170	Notice of Appeal	
1402	340	2402	170	Filing a brief in support of an appeal	340.00
1403	300	2403	150	Request for oral hearing	
1451	1,510	1451	1,510	Petition to institute a public use proceeding	
1452	110	2452	55	Petition to revive - unavoidable	
1453	1,370	2453	685	Petition to revive - unintentional	
1501	1,370	2501	685	Utility issue fee (or reissue)	
1502	490	2502	245	Design issue fee	
1503	660	2503	330	Plant issue fee	
1460	130	1460	130	Petitions to the Commissioner	
1807	50	1807	50	Processing fee under 37 CFR 1.17(q)	
1806	180	1806	180	Submission of Information Disclosure Stmt	
8021	40	8021	40	Recording each patent assignment per property (times number of properties)	
1809	790	2809	395	Filing a submission after final rejection (37 CFR 1.129(a))	
1810	790	2810	395	For each additional invention to be examined (37 CFR 1.129(b))	
1801	790	2801	395	Request for Continued Examination (RCE)	
1802	900	1802	900	Request for expedited examination of a design application	

Other fee (specify) _____

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) ($) 340.00

SUBMITTED BY				(Complete *(if applicable)*)	
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AF/3641
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of Atkinson et al.	)	
Serial No.: 09/864,339	)	Group Art Unit: 3641
Filed: May 25, 2001	)	Examiner: Edward A. Miller
For: Reduced Energy Blasting Agent and Method	)	

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

BRIEF OF APPELLANTS

This is an appeal from the final rejection of the Examiner dated April 23, 2004, rejecting claims 10-11, 13-16 and 18, all of the claims in the case. This Brief is filed in triplicate and accompanied by the requisite fee set forth in Rule 1.17(c).

Real Party in Interest

Applicants (also referred to herein as appellants) have assigned their rights to the invention and this application to their employer, Dyno Nobel Inc., and such assignment has been recorded by the Assignment Division of the U.S. Patent and Trademark Office.

No Related Appeals and Interferences

There are no related appeals and interferences.

Status of Claims

Claims 10-11, 13-16 and 18 are the subject of this appeal and are set out in the Appendix. No other claims are pending. Claims 1-9, 12, 17 and 19-24 have been cancelled. (Claims 1-9 and 19-24 were cancelled in response to an election requirement.)

Status of Amendments

The last amendment was filed in this case on October 21, 2003, and entered by the Examiner. The claims as set out in the Appendix include the entered amendments.

Summary of Invention

The invention relates to a water-in-oil emulsion blasting agent (or in common terms an "explosive") that comprises an inorganic oxidizer salt solution as a discontinuous phase and an

organic liquid fuel as a continuous phase of the emulsion (both phases together commonly are referred to as the "emulsion phase"). More particularly, the invention relates to a method of variably reducing the energy of the emulsion blasting agent by the addition of an energy reducing agent (water or aqueous solution) in a way that does not destabilize or desensitize the emulsion phase. Emulsion blasting agents or explosives typically are used for fracturing or displacing rock, ore or overburden in mining and construction applications. The water or aqueous solution is added in the form of a second discontinuous phase so as not to destabilize or desensitize the emulsion blasting agent to initiation and detonation. See also the "Background" subsection in the "Argument" section below.

Issue

Whether claims 10-11, 13-16 and 18 are patentable under 35 USC 103 over Lawrence et al. (U.S. patent no. 4,526,633) in view of Engsbraten (U.S. patent no. 5,271,779), Waldock (U.S. patent no. 4,959,108) and Patterson et al. (U.S. patent no. 5,670,739), in further view of Guralnik (a dictionary reference) and Conrad (U.S. patent no. 3,692,547).

Grouping of Claims

For the ground of rejection that appellants contest herein that applies to more than one claim, such additional claims, to

the extent separately identified and argued below, do not stand or fall together.

The Argument

Background. A water-in-oil emulsion is an intimate dispersion of discrete, fine droplets of water or aqueous solution (in this case an inorganic oxidizer salt solution) in a continuous oil phase that forms a thin film of oil around each droplet. An emulsifier is present in minor amount as a surface active agent to help keep the phases separate and the droplets dispersed. A commonly known water-in-oil emulsion is mayonnaise. In an emulsion blasting agent, the weight ratio of the droplets to oil is roughly 94:6, and the volume ratio is roughly 90:10. A cross-section of an emulsion phase would look somewhat like a cross-section of a beehive, with the walls of the beehive honeycomb structure representing the continuous oil phase and the hexagonal cells representing the solution droplets.

This emulsified state is thermodynamically and inherently unstable, since the droplets want to coalesce and the dissolved salts in the droplets become supercooled (following formation of the emulsion at a temperature above the crystallization temperature of the inorganic oxidizer salt solution) and thus want to crystallize. Either of these events can cause a breakdown of the

emulsion phase and consequent desensitization of the emulsion blasting agent to detonation. (This desensitization occurs because the oxidizer molecules from the inorganic oxidizer salt solution droplets and the fuel molecules from the organic liquid continuous oil phase are no longer as intimately in contact with each other and thus cannot react as readily to produce an explosive reaction.)

Maintaining a stable and thus sensitive emulsion phase is a ongoing struggle in the explosives industry, particularly when the emulsion phase is subjected to shear stress during transfer or loading operations (such as when pumping the fluid emulsion blasting agent from one container to another or into a borehole) or when additional ingredients are added and mixed into the emulsion phase (such as energizing aluminum particles or sensitizing glass microballoons). These dynamic operations can cause or accelerate the breakdown of the emulsion phase.

Further, water is known to desensitize emulsion blasting agents since it is non-reactive (essentially inert), absorbs energy (especially when vaporized) and generally dilutes the reactive components.

The method of the present invention provides way in which an energy-reducing agent (water or aqueous solution) can be added and dynamically mixed into the emulsion phase to reduce significantly

the energy of the emulsion blasting agent without unduly destabilizing and desensitizing it.

Appellants previously appealed to this Board a final rejection (mailed June 26, 2003) of this application and filed an Appeal Brief on January 28, 2004. The Examiner then withdrew that earlier final rejection and issued a new final rejection that was mailed April 23, 2004. This appeal is from that rejection.

The Claims. Independent claim 10 contains a method "of reducing the energy of an emulsion blasting agent as it is being loaded into a borehole" comprising the steps of selecting an emulsion blasting agent as specified, conveying the emulsion blasting agent, adding an energy-reducing agent (limited to water or aqueous solution) to the emulsion blasting agent as it is being conveyed, mixing the energy-reducing agent uniformly and homogeneously into the emulsion blasting agent in the claimed amount "to form a second discontinuous phase," adding gassing agents and loading the conveyed emulsion blasting agent into a borehole. By adding the energy-reducing agent as a second discontinuous phase, the gassed emulsion blasting agent is found to retain both its sensitivity and stability, which would not be the case if the significant amounts of water or aqueous solution as taught in the specification were combined initially with the inorganic oxidizer salt solution or if the water or aqueous

solution were added in a manner that did not form a second discontinuous phase, i.e., the water combines with the original discontinuous phase.

Dependent claim 15 specifies that the borehole is a perimeter borehole, which as explained in the specification on pages 2-4, makes the invention particularly advantageous since perimeter boreholes can be loaded with a less energetic emulsion blasting agent, while the internal boreholes in the pattern can receive a more energetic load, both from the same base emulsion blasting agent formulation. This versatility is highly desirable and is not disclosed in the cited references.

Dependent claim 16 further allows for energy and density variation throughout the length of a given borehole, also advantageous as explained in the full paragraph on page 4 of the specification.

In essence, the invention provides a way to reduce significantly the energy of an emulsion blasting agent without desensitizing or destabilizing it. Simply adding from about 5% to about 22.5% by weight of additional water or aqueous solution to an emulsion blasting agent, without forming a second discontinuous phase, would be detrimental if not fatal to the performance of the explosive.

The limitations in independent claim 10 distinguish it from the prior art. The claim requires that the energy-reducing agent, either water or an aqueous solution, be mixed uniformly and homogeneously into the emulsion blasting agent "to form a second discontinuous phase." This is not just "watering down" an explosive, as the Examiner alleges. Rather, it is an inventive way of adding water to an explosive to reduce its energy without desensitizing or destabilizing it. (The original or first discontinuous phase remains essentially intact and reactive with the surrounding fuel phase during the detonation.) This is not disclosed, suggested or implied in any of the references cited by the Examiner.

Cited References (first three). Lawrence et al., Engsbraten and Waldock all disclose adding "dry" ingredients to an emulsion phase. See Lawrence et al., col. 2, lines 55-59; Engsbraten, col. 2, lines 46-49; and Waldock, col. 3, lines 57-62. Although Lawrence et al. disclose that the proportion of ingredients being blended to form a slurry blasting agent (which has a continuous aqueous phase) can be varied as the composition is being delivered into the borehole (col. 1, lines 42-54), they disclose in col. 2 adding only dry ingredients to an emulsion blasting agent. Engsbraten discloses the use of porous, non-aqueous, bulk fillers (solids) as his energy-reducing agent. Once combined with an

emulsion phase, the mixture becomes non-pumpable. Further, the emulsion phase in Engsbraten is used in an amount only sufficient for improving adherence between the particulate oxidizer salt and the particulate filler. Waldock similarly uses an inert bulking agent to vary the energy in his composition. This inert, solid bulking agent behaves as an energy diluent, decreasing the "shock" energy by absorbing heat and not providing additional work energy during detonation.

In contrast, claim 10 requires the addition of an energy-reducing agent in the form of water or aqueous solution. Step d) of claim 10 further requires that the liquid energy-reducing agent form a second discontinuous phase in the water-in-oil emulsion phase. The three cited references described above are fatally deficient in that they do not disclose the addition of a liquid, energy-reducing agent in the form of water or aqueous solution and in the claimed amount to an already formed emulsion blasting agent and that such energy-reducing agent be mixed uniformly and homogeneously into the emulsion blasting agent "to form a second discontinuous phase."

As explained in the specification on page 5, lines 7 et seq.:

> The present invention differs from this prior art in that the water or aqueous solution added to the emulsion

> blasting agent in the present invention is added to the emulsion blasting agent in an amount sufficient to reduce significantly its energy and is mixed uniformly and homogeneously throughout the emulsion phase. In fact, when mixed in this manner the water or aqueous solution forms a second discontinuous droplet phase to that formed by the initial oxidizer salt solution component. This second discontinuous phase renders the emulsion blasting agent more sensitive and stable than if the water or aqueous solution were combined initially with the inorganic oxidizer salt solution or if they were not mixed uniformly and homogeneously throughout the emulsion phase. (Emphasis supplied.)

Remaining Cited References. Appellants take no issue with the Examiner's citation of Guralnik (a dictionary definition) or Conrad, which discloses, as the Examiner indicates, controlling density by subsequent addition of ingredients. In fact, this is discussed in general in the background section of appellants' specification.

Patterson et al., first brought to the attention of the Examiner by applicants in their amendment filed October 21, 2003, at first blush, appears to be closer art. Although Patterson et al. disclose an emulsion composition having a second discontinuous

phase, the second discontinuous phase is added in the form of another emulsion phase, not water or aqueous solution as required in claim 10, and thus the resulting composition is a blend of two emulsions. Moreover, the second emulsion phase is added principally to increase stability of the composition, particularly when AN prills are used. (See col. 4, lines 9-19.) Further, the second emulsion phase is not added as the emulsion blasting agent is being conveyed for loading into a borehole, as required in claim 10. The second emulsion phase in Patterson et al. is a cumbersome way to add water and requires that two separate emulsion phases first be formed and then handled separately. The Patterson et al. reference does not render the claimed invention obvious.

The Examiner's Broad Claim Construction. The Examiner simply is wrong in construing claim 10 so broadly that Patterson et al., in his opinion, invalidates it. The Examiner incorrectly construes the "comprising" term in the preamble of method claim 10 as opening the Markush expression in step c) of claim 10 to components other than those listed. Even though the preamble in method claim 10 contains "comprising" before the listing of the method steps, that does not mean that the Markush expression in step c) ("selected from the group consisting of water and aqueous solutions") somehow should be read to include a water-in-oil emulsion phase (as disclosed in Patterson et al.) as an unspecified third member of the group. The "consisting of" language in step c) refers to

components, not method steps, and thus claim 10 is closed with respect to those components. See Berenter v. Quigg, 14 USPQ 2nd 1175 (DC Dist. Of Columbia 1988), also cited in Ex Parte Jerold C. Rosenfeld et al., 1997 WL 33135341, (Bd.Pat.App. & Interf. Jan. 1, 1997) (Appeal No. 1997-2572, Application 08/220,562). That is the proper and logical way to read claim 10. Moreover, the specification supports this logical construction since the only energy reducing agents disclosed therein are water and aqueous solutions.

The Examiner's "Watered Down" Arguments. In his office actions, the Examiner goes to length to explain what he means by "watered down," and also that a strong emulsion (explosive) may be later "watered" as desired for diluted strength. Appellants do not take issue with these characterizations or that it would be expected that simply adding water would have this effect. But as stated above this is not what appellants are claiming.

Even though appellants' final composition contains a considerable amount of water, it remains stable and detonable over time because the additional water is added to the emulsion phase in the form of a second discontinuous phase. If that amount of water simply were added to or combined with the aqueous salt solution used to form the emulsion phase, the same detonability would not be

achieved. Thus the order of the steps and manner of incorporation are important.

Appellants have found that by mixing this high amount of water or aqueous solution uniformly and homogeneously into the emulsion blasting agent to form a second discontinuous phase, the emulsion remains reliably detonable. For example, mix 4, described on page 12 of the specification, and in Tables 1 and 2 on page 13, sat for one hour before being detonated but remained reliably detonable even when its volume energy was reduced by about 55% and as much as 20% by weight water was added and mixed uniformly and homogeneously into the composition. Thus the order of addition of the water or aqueous solution energy-reducing agent is important. The energy-reducing agent must be added to an already formed emulsion blasting agent in order for the energy-reducing agent to form a second discontinuous phase within the continuous phase of the emulsion blasting agent.

Another advantage of the invention is that the energy-reducing agent reduces significantly the shock to bubble energy ratio of the emulsion blasting agent. As explained on page 12 of the specification:

> The shock to bubble energy ratio changed from about 56/44 with standard emulsion blasting agent (mix 1) to

about 40/60 for gassed emulsion blasting agent with 20% energy-reducing agent (mix 4). This shift in energy from shock to bubble is highly desirable in blasting operations where wall and perimeter control is required.

None of the references teach or disclose this beneficial effect of decreasing the shock to bubble energy ratio.

In the Examiner's last communication, his Advisory Action mailed August 20, 2004, he holds to his characterization of the invention: "This invention really is watering down the emulsion explosive." He is looking at a perceived end result and not the method claim language. Appellants have shown (and claimed) that how and when the water is added is key. The Examiner's gratuitous comment about this invention possibly showing up on an internet page as a "funny patent" at best indicates to appellants a lack of understanding of the invention. In dismissing the declaration filed in the case, the Examiner comments that the declarant appears to misunderstand the prior art and the "broad claim construction" employed by the Examiner. His further comment that "patent law concepts are less understood by those not versed in patent law" also is unhelpful because his asserted broad claim construction is shown above simply to be too broad in view of the "consisting of" language in step c) of claim 10 and applicable case law.

Conclusion

For the reasons set forth above, appellants respectfully contend that each claim is patentable, and therefore, reversal of the rejection is solicited.

Respectfully submitted,

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Date: November 19, 2004

Appendix

10. A method of reducing the energy of an emulsion blasting agent as it is being loaded into a borehole comprising the steps of:

a) selecting an emulsion blasting agent comprising an aqueous inorganic oxidizer salt solution forming in droplet form a discontinuous phase and an organic liquid fuel forming a continuous phase;

b) conveying the emulsion blasting agent;

c) adding an energy-reducing agent to the emulsion blasting agent as it is being conveyed wherein the energy reducing agent is selected from the group consisting of water and aqueous solutions;

d) mixing the energy-reducing agent uniformly and homogeneously into the emulsion blasting agent to form a second discontinuous phase in an amount of from about 5% to about 22.5% by weight of the emulsion blasting agent;

e) adding gassing agents to the emulsion blasting agent to reduce its density and increase its sensitivity; and

f) loading the conveyed emulsion blasting agent into a borehole.

11. A method according to claim 10 wherein the energy-reducing agent is added in an amount of from about 7.5% to about 17.5% by weight of the emulsion blasting agent.

13. A method according to claim 10 wherein the aqueous solutions contain solutes selected from the group consisting of inorganic oxidizer salts, urea, glycols and inorganic acids.

14. A method according to claim 10 wherein the gassing agents are added in amounts sufficient to reduce the density of the emulsion blasting agent to a range of from about 0.60 g/cc to about 1.30 g/cc.

15. A method according to claim 10 wherein the borehole is a perimeter borehole.

16. A method according to claim 10 wherein the energy reducing agent and gassing agents are added in varying amounts as the borehole is loaded to impart varying energies and densities to the emulsion blasting agent throughout the length of the borehole.

18. A method according to claim 10 wherein the conveyed emulsion is pumped.